DH2323 focusses on intermediate level computer graphics and interaction programming using C++ and libraries and game technologies, such as OpenGL and the Unity game engine.
Students must pass labs (P/F: 3,0hp) and their final grade is then determined through their performance on a project (A-F, 3,0hp).

Summary of course changes
Added a template for the first lab report in order to make reporting expectations clearer.
Migrated all labs fully to SDL 2.

Overview

Aspect	Feedback and action
The lectures are very informative and concise. Interesting labs, great lectures, I like that the project is so free. I do appreciate the ability to work at my own pace	As always, the flexible nature of the course, freedom of the project and focus on empowering students as active participants in the teaching process was popular.
The assignment is designed well. I got supportive guidance in the instructions The lab instructions were lackluster, with poor English writing, and not very clear in certain areas.	The feedback about lab instructions is again mixed this year. While anecdotal evidence suggests that students appreciated the new template for the first lab report and it made the expected submission a lot clearer, some issues still remain with the clarity of the animation and rendering lab track labs. We will continue to update and improve these further (some improvements have already been made to the structuring of the rendering track labs, but more are needed). The rendering track labs seems to be more troublesome, so we may produce a lab template for that track.
Because of the hybrid nature I could study whenever and wherever I wanted (good for me, being very much a night owl). I attended most of the lectures physically but had some that I had to attend via zoom, which was very convenient. I liked it a lot! I preferred the in-person lectures, but when I didn't have the time or I couldn't make it for some other reason, I knew I could attend via Zoom. That was reassuring.	We really want to support your studies and give you control of how you learn and helping you balance your private life and commitments with study. However, also be aware of the pitfalls: when given such flexibility there are responsibilities: it is also possible to adopt approaches that may not benefit you over the long run. For example, one may not properly engage with the course and therefore miss some fundamental aspects of it unless one carefully consults the course materials. But experiment and see what works well for you in the long term!
More options for feedback. I rarely knew if my lab work was sufficient.	It is important for students to be aware that are typically 12 lab help sessions throughout the course, each lasting 2 hours and available to attend online (making it easier to demonstrate work done on your computer by screen sharing). The *only* purpose of the lab sessions is to give *individualised feedback* on lab and project work. There is also the formative lab submission. Please make use of

	these opportunities for feedback, as they are clearly communicated but typically under-utilised by the students!
Don't bother with C++, use something that makes sense	C++ makes a lot of sense of some students, and no sense at all to others – your (collectively) mileage will definitely vary. Although we provide the lab framework in C++, any language of your choice can be used, including scripting languages such as Python and Javascript since the main focus of the course is at the algorithmic level. We provide the instructions by default in C++ since that is the most difficult language typically chosen by students and many would like to learn it due to its continuing importance for professional real-time computer graphics applications. In future, we will try to do more to also to support other languages e.g. through the sample lab code.

Details

This year, all LEQ scores fell within the range 3.9 to 6.7. The three lowest scoring areas were (3.9/7) 5: *I felt togetherness with others on the course*, 18: *I regularly spent time to reflect on what I learned*, (4.1/7) and 14: *I received regular feedback that helped me to see my progress* (4.5/7).
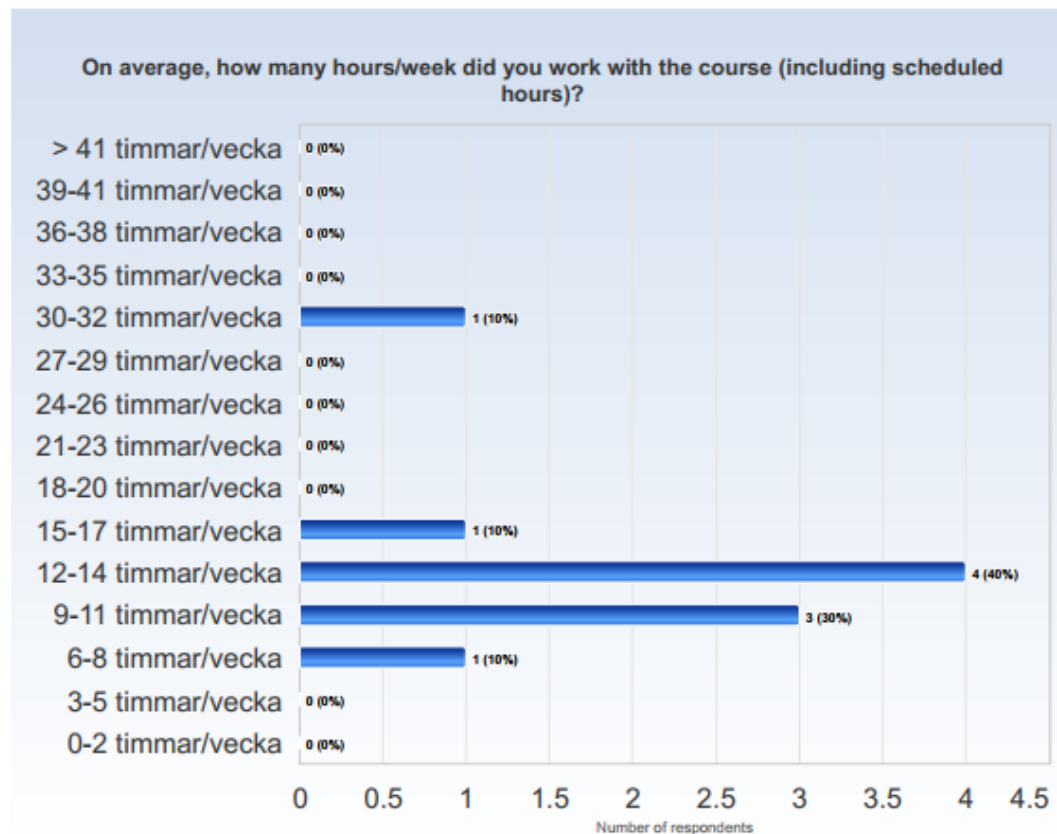
In relation to 5, the sense of togetherness, the course is run in hybrid mode with lectures taking place both online and physically, while due to lack of attendance in previous years, labs are run online only. Additionally, all course assessment (labs and project) allows for both group work and individual work. For these reasons, it is understandable that students who elect to attend online only and do course exercises individually will not feel as strong a sense of togetherness as those who attend physically and do course exercises in groups. Some ideas to alleviate this include a special session for matchmaking for those who wish to join a group (although these sessions have not been well attended in the past) as well as a special section on Canvas to support it. However, forming groups is likely complicated by the need for students to match their goals in terms of effort and course grade, as well as synchronise the timing of their efforts due to the flexibility of the course. Overall, engaging in group work will remain optional for students and will not be enforced by the course.

In relation to point 14 about receiving regular feedback, this is also a responsibility for the students that is clearly communicated throughout the course. Since point 22: "I was able to get support if I needed it" was rated highly at 6/7, it suggests that students who were not proactive in seeking feedback do not receive it, even though they knew feedback was available if they sought it. This reflects the pedagogical principle in the course of putting equal responsibility on students to be active participants in their own studies, for example, throughout the project specification and implementation phases, as well as actively seeking help and feedback in the many lab help sessions scheduled throughout the course.

In relation to the course survey, there were relatively few respondents (10) despite a drive asking students to complete the evaluation. Part of the issue surrounds the automation of the course survey via KTH Social, which does not CC a copy to any of the course team, making reminders to search for it necessarily vague. The timing of the survey is potentially also an issue: it has typically been sent to students as late in the course as possible in order to try to get a more comprehensive and summative view of their opinions of the course. However, once students have submitted all course assessment materials and are also busy with exams in other courses, it is understandable that they might be more likely to pass over the survey. Next year, we will send out the survey slightly sooner in the course.

LEQ Course evaluation data follows:

ESTIMATED WORKLOAD

On average, how many hours/week did you work with the course (including scheduled hours)?

Interval	Respondents
> 41 timmar/vecka	0 (0%)
39-41 timmar/vecka	0 (0%)
36-38 timmar/vecka	0 (0%)
33-35 timmar/vecka	0 (0%)
30-32 timmar/vecka	1 (10%)
27-29 timmar/vecka	0 (0%)
24-26 timmar/vecka	0 (0%)
21-23 timmar/vecka	0 (0%)
18-20 timmar/vecka	0 (0%)
15-17 timmar/vecka	1 (10%)
12-14 timmar/vecka	4 (40%)
9-11 timmar/vecka	3 (30%)
6-8 timmar/vecka	1 (10%)
3-5 timmar/vecka	0 (0%)
0-2 timmar/vecka	0 (0%)

Number of respondents

Comments

Comments (I belonged to: Grupp 1)
A rough estimation but I tried to include lectures, pre recordings of lectures, lab work and project work.
I think the workload has worked well for me. I have problems with ADHD but have managed to do well in this course, at least from my own perspective.

Comments (I belonged to: Grupp 2)
Labs didn't take much time, didn't attend a few lectures. Only the project took any substantial amount of time.

Comments (I belonged to: Grupp 6)
It was a good workload. The majority of the work was spent on the labs/project.

KTH Learning Experience Questionnaire v3.1.4

Meaningfulness - emotional level

Stimulating tasks

1. I worked with interesting issues (a)

Exploration and own experience

2. I explored parts of the subject on my own (a)
3. I was able to learn by trying out my own ideas (b)

Challenge

4. The course was challenging in a stimulating way (c)

Belonging

5. I felt togetherness with others on the course (d)
6. The atmosphere on the course was open and inclusive (d)

Comprehensibility - cognitive level

Clear goals and organization

7. The intended learning outcomes helped me to understand what I was expected to achieve (e)
8. The course was organized in a way that supported my learning (e)

Understanding of subject matter

9. I understood what the teachers were talking about (f)
10. I was able to learn from concrete examples that I could relate to (g)
11. Understanding of key concepts had high priority (h)

Constructive alignment

12. The course activities helped me to achieve the intended learning outcomes efficiently (i)
13. I understood what I was expected to learn in order to obtain a certain grade (i)

Feedback and security

14. I received regular feedback that helped me to see my progress (j)
15. I could practice and receive feedback without being graded (j)
16. The assessment on the course was fair and honest (k)

Manageability - instrumental level

Sufficient background knowledge

17. My background knowledge was sufficient to follow the course (f)

Time to reflect

18. I regularly spent time to reflect on what I learned (l)

Variation and participation

19. The course activities enabled me to learn in different ways (m)
20. I had opportunities to influence the course activities (m)

Collaboration

21. I was able to learn by collaborating and discussing with others (n)

Support

22. I was able to get support if I needed it (c)

Average response to LEQ statements - all respondents
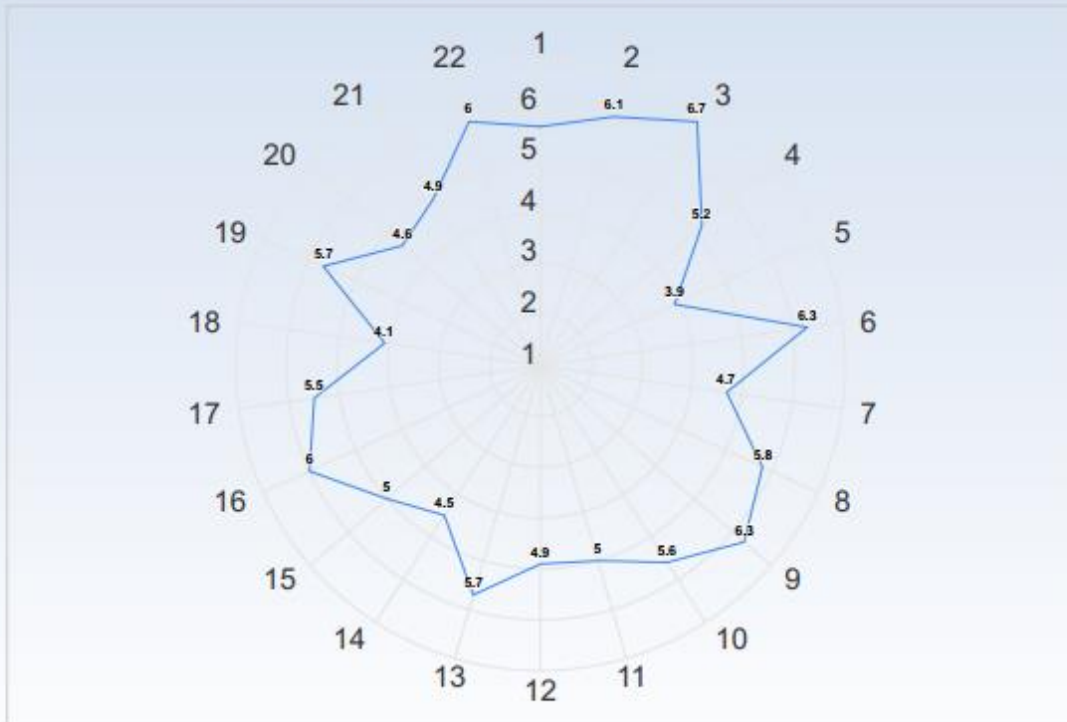
Average response to LEQ statements - all respondents per disability
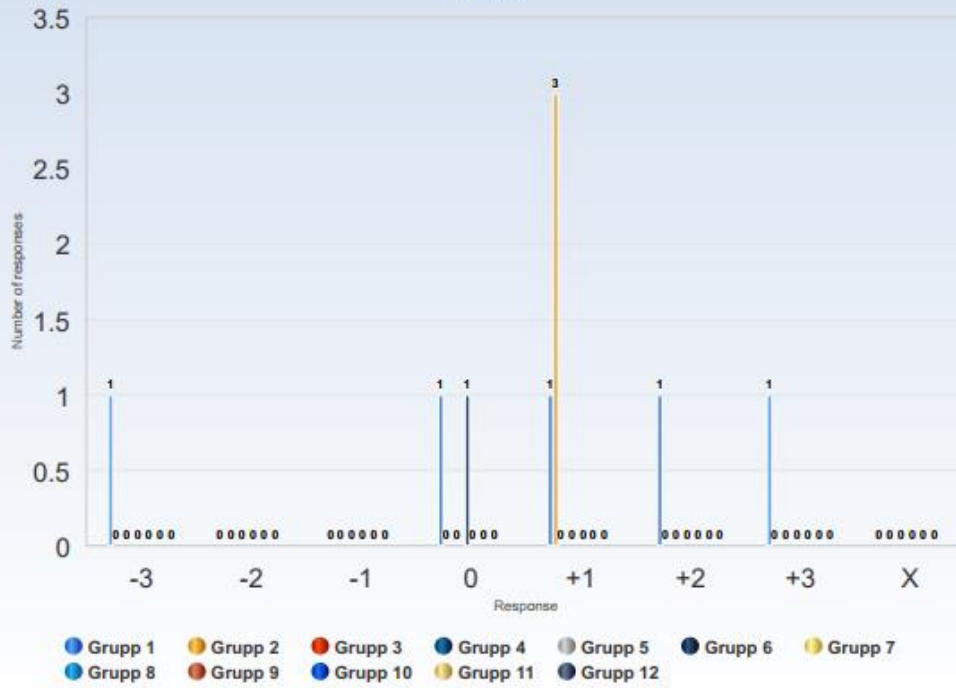
Legend: Ja, Nej, Vill ej uppge
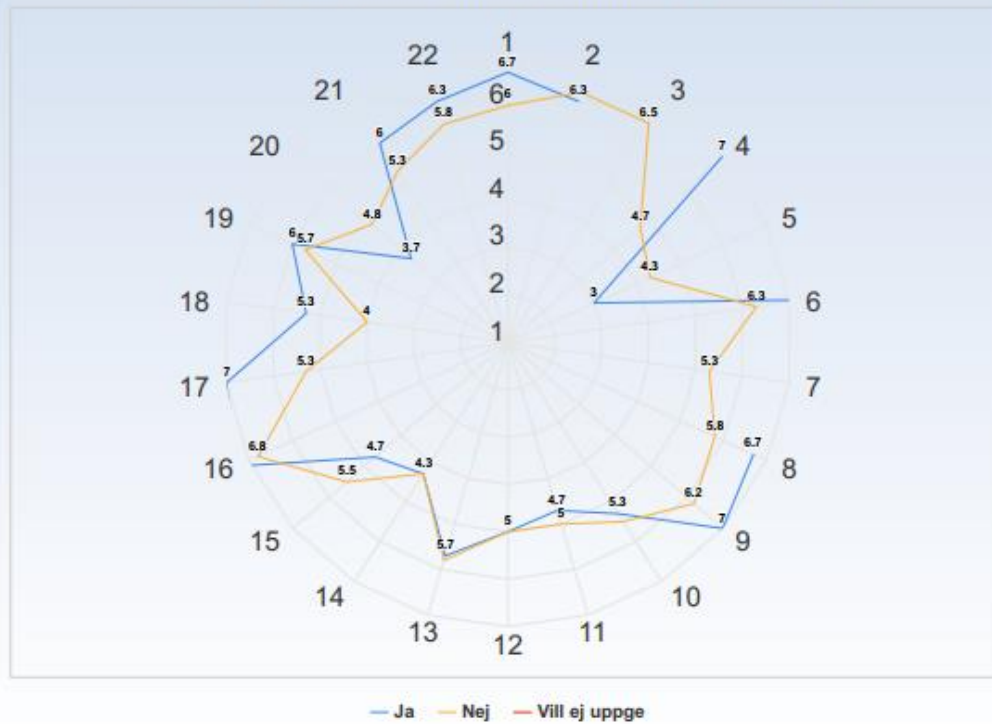
Comments

Comments (I belonged to: Grupp 1)

I have ADD, and how pedagogical the lecturer is affects me a lot. Many (most) KTH professors I've had so far have been lacking in this regard. This course definitely stands out. I really enjoyed the lectures, I learned a lot, and they were very interesting. I also appreciated the different perspectives - from the technical methods (like ray tracing) to the philosophical ideas (like simulating reality).

ADHD, social phobia, Autism Spectrum Disorder.

I don't like to talk about this, but I do appreciate the ability to work at my own pace.

1. I worked with interesting issues

2. I explored parts of the subject on my own

3. I was able to learn by trying out my own ideas

4. The course was challenging in a stimulating way

5. I felt togetherness with others on the course

6. The atmosphere on the course was open and inclusive

7. The intended learning outcomes helped me to understand what I was expected to achieve

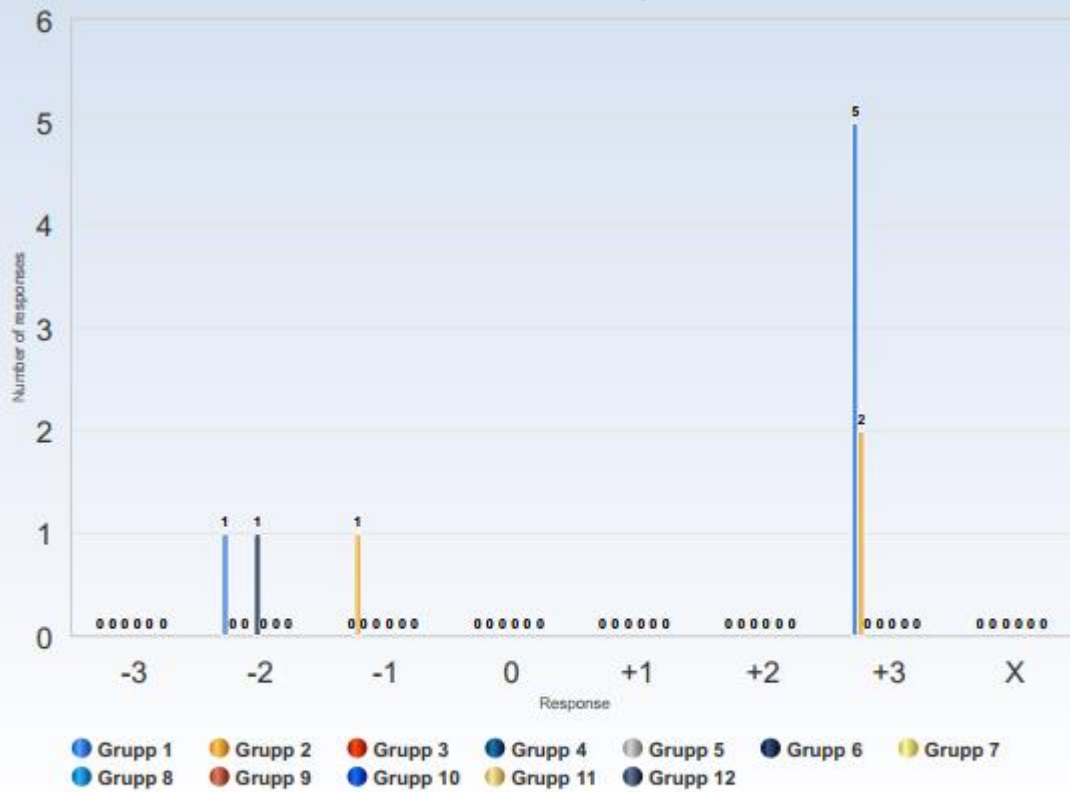## 8. The course was organized in a way that supported my learning
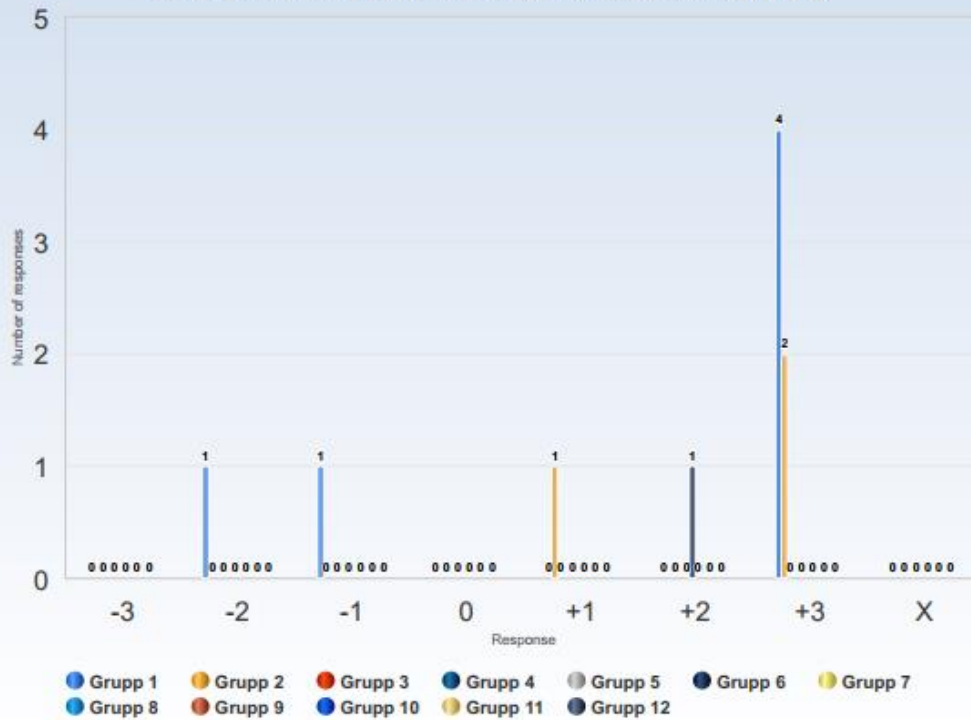
9. I understood what the teachers were talking about
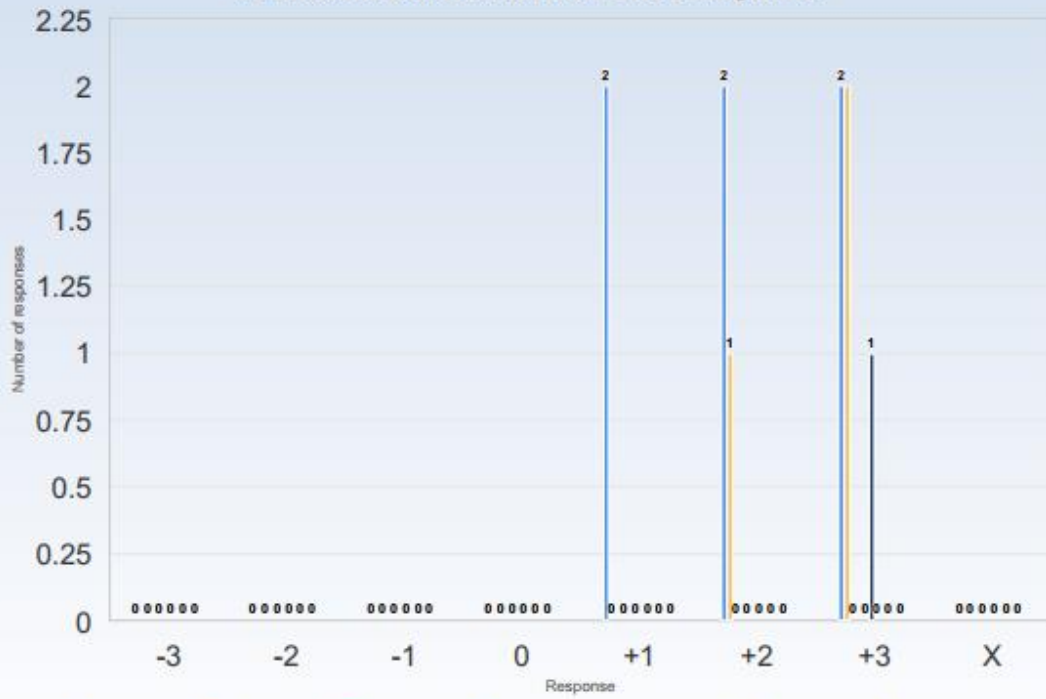
10. I was able to learn from concrete examples that I could relate to

Comments

Comments (I belonged to: Grupp 1)
Yes! Both lab tracks are great for this!

11. Understanding of key concepts had high priority
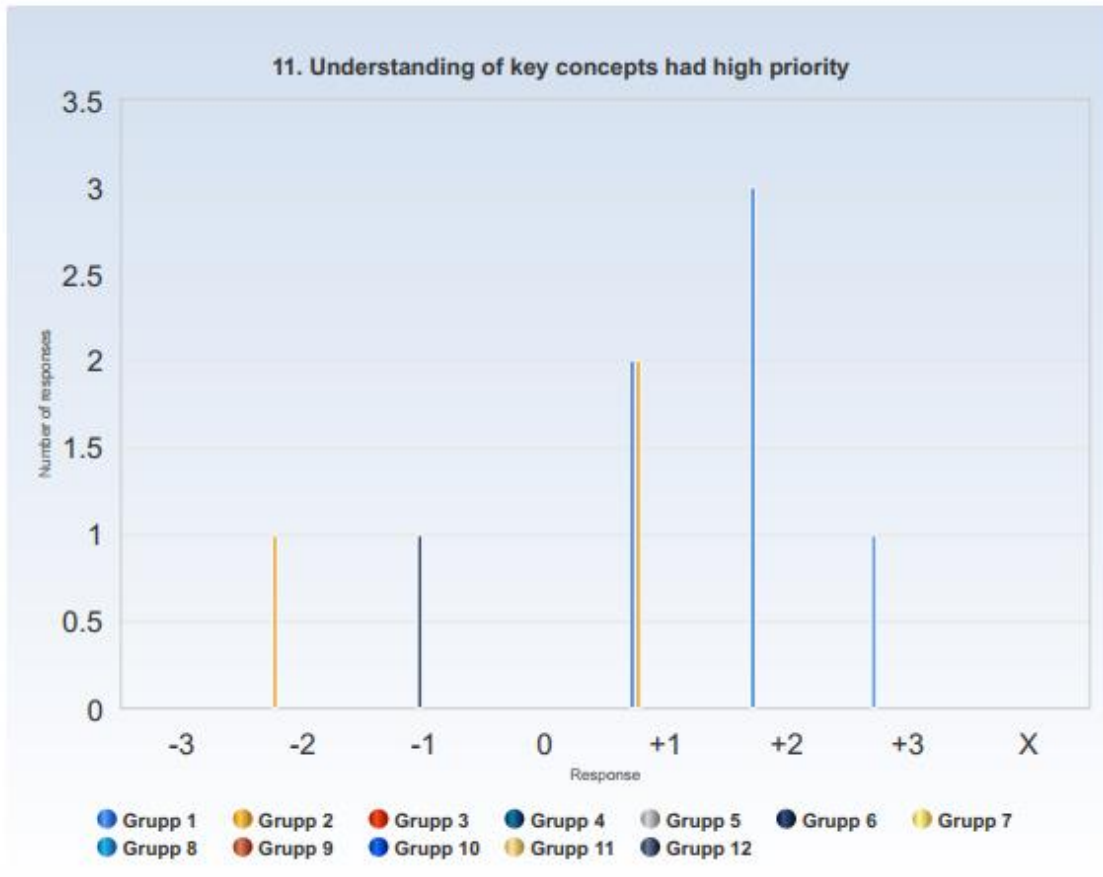
Comments

Comments (I belonged to: Grupp 2)
Most of the lecture content felt irrelevant to anything that's graded

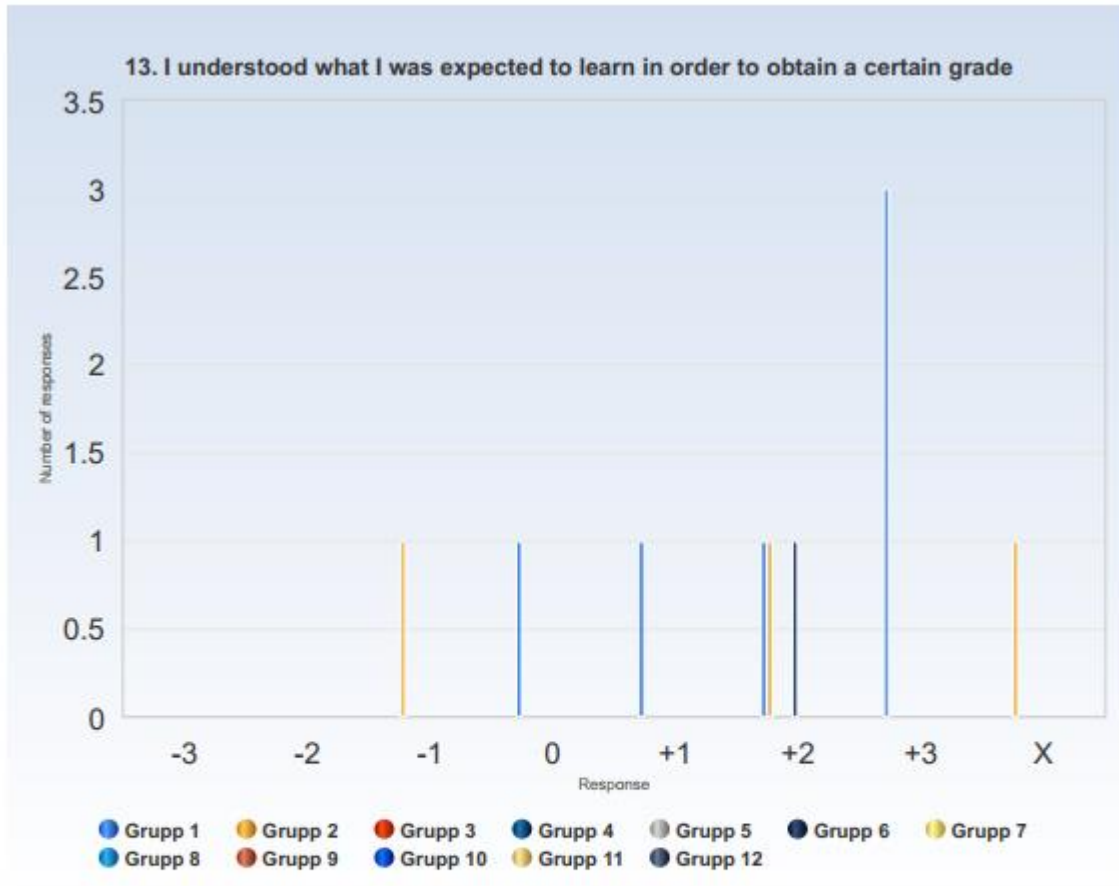## 12. The course activities helped me to achieve the intended learning outcomes efficiently

Grupp 1 **Grupp 2** **Grupp 3** **Grupp 4** **Grupp 5** **Grupp 6** **Grupp 7**
Grupp 8 **Grupp 9** **Grupp 10** **Grupp 11** **Grupp 12**
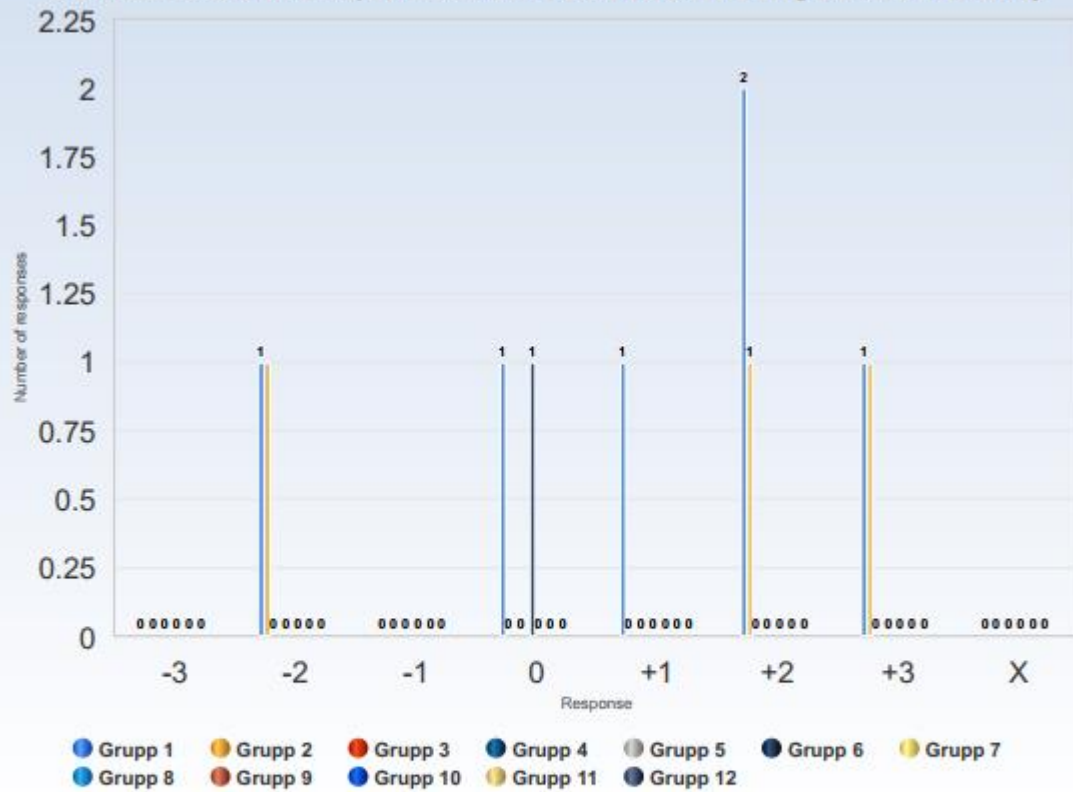
Comments

(I belonged to: Grupp 2)
The lab tracks being separate from the project is good

13. I understood what I was expected to learn in order to obtain a certain grade

Comments

Comments (I belonged to: Grupp 1)
Not entirely, it's still a bit unclear what separates different levels of work in the project.

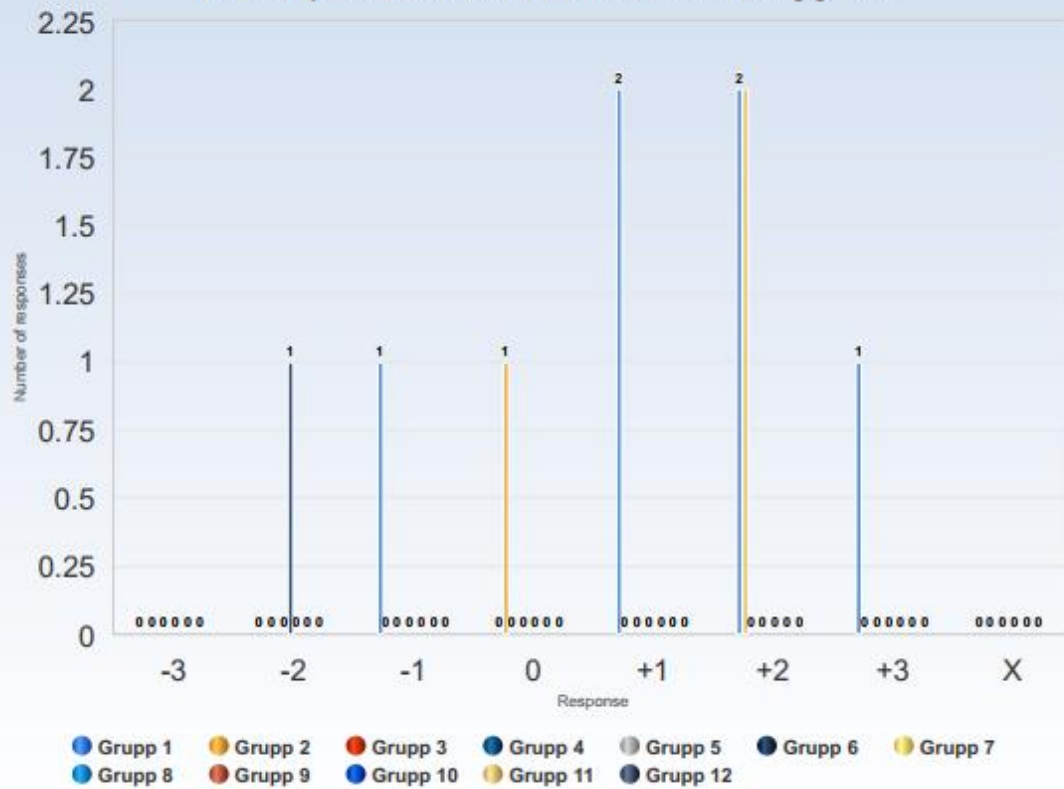## 14. I received regular feedback that helped me to see my progress
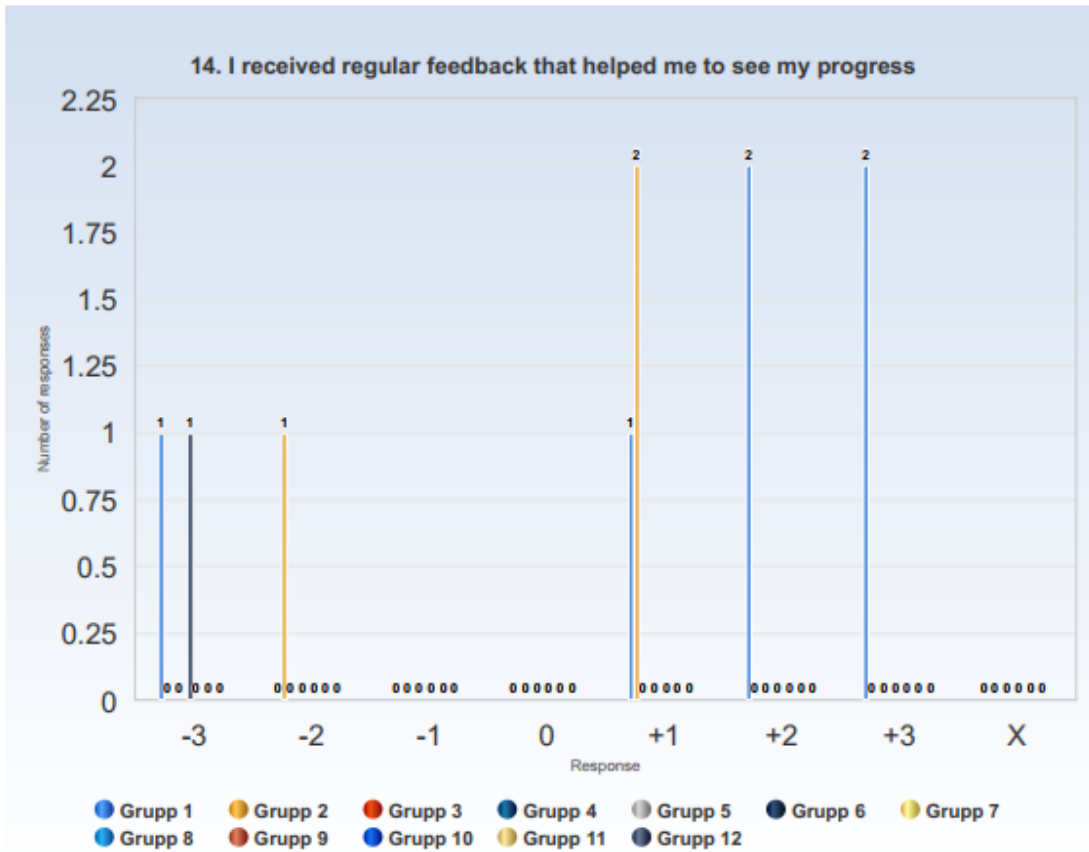
Comments

Comments (I belonged to: Grupp 2)
More feedback than usual, but I felt like most of it was due to communication issues

Comments (I belonged to: Grupp 6)
This is something I missed. You did not know yhow you did because you handed everything in at the end. Would be nice with more feedback.

15. I could practice and receive feedback without being graded

Legend: Grupp 1, Grupp 2, Grupp 3, Grupp 4, Grupp 5, Grupp 6, Grupp 7, Grupp 8, Grupp 9, Grupp 10, Grupp 11, Grupp 12
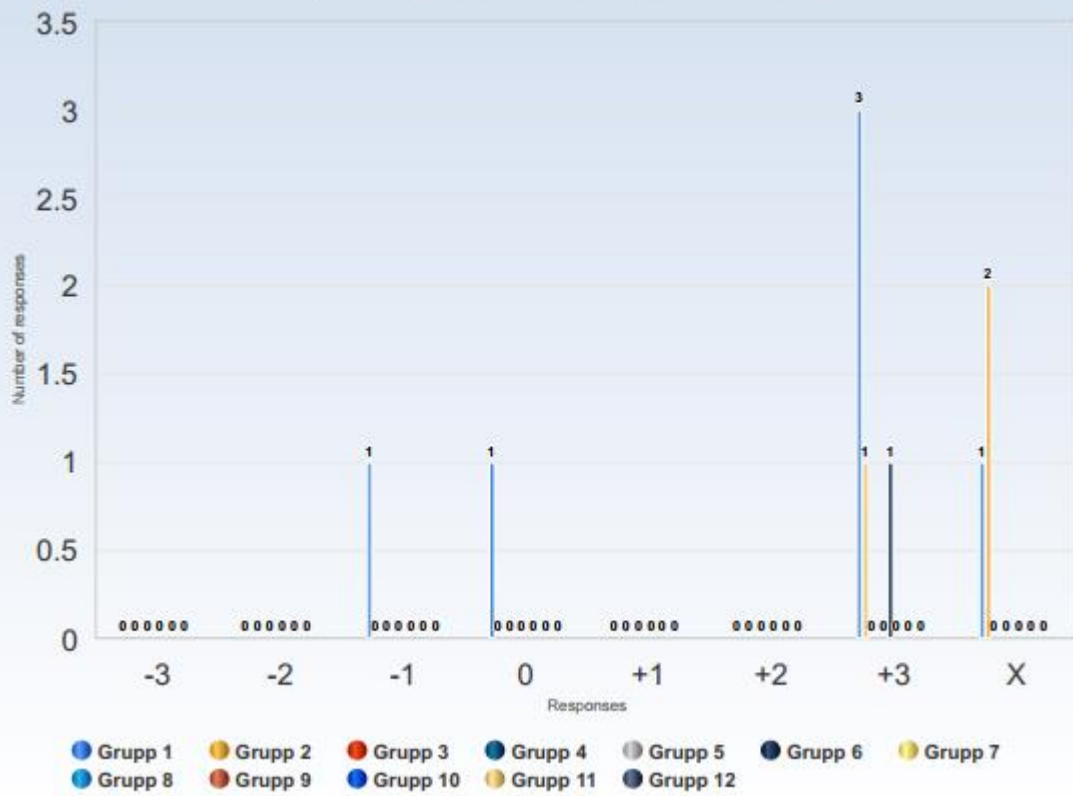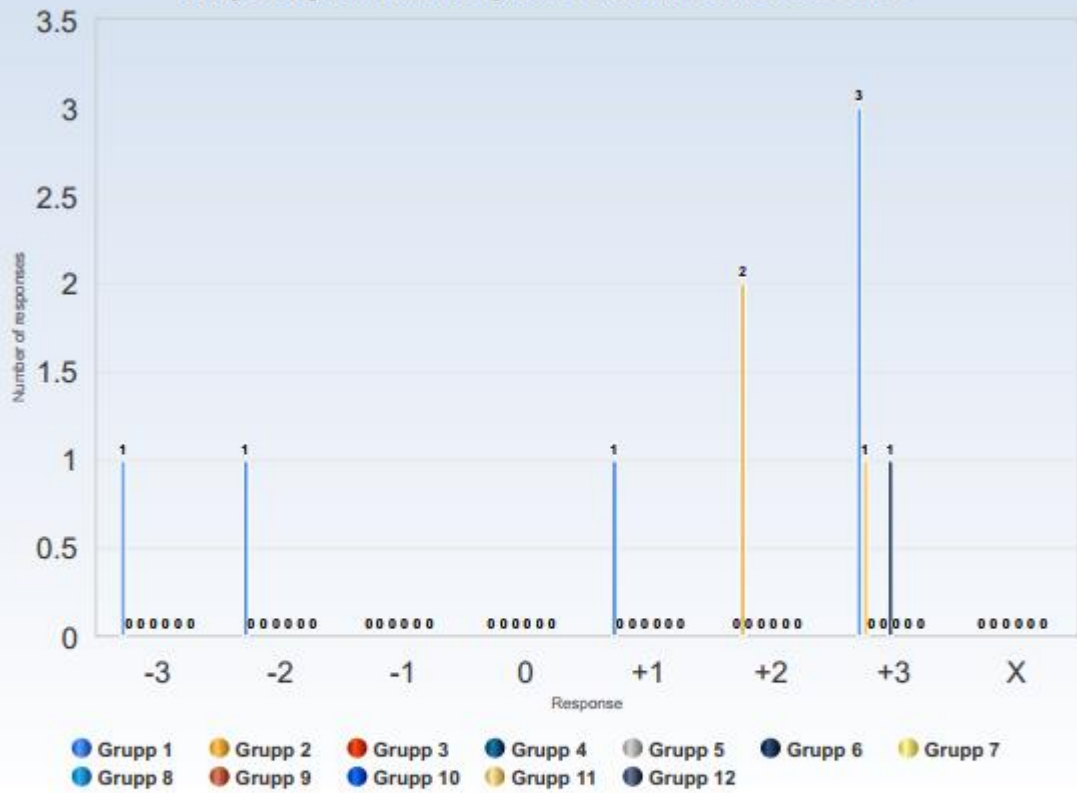
Comments

Comments (I belonged to: Grupp 1)

Yes, but we only had one such opportunity. It would be nice to have more optional submissions because I am quite bad at social interaction.

16. The assessment on the course was fair and honest

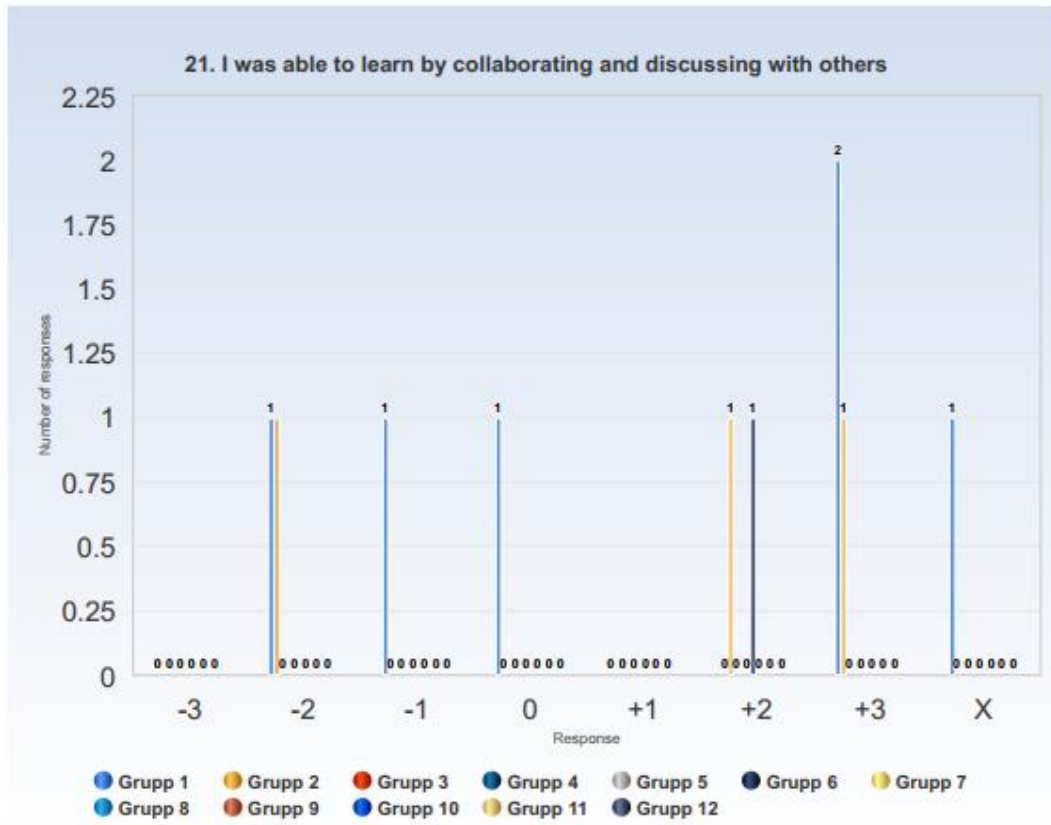## 17. My background knowledge was sufficient to follow the course

Comments

Comments (I belonged to: Grupp 1)
It is very important to make sure people have studied Invis before this course!

Comments (I belonged to: Grupp 2)
The introduction to visualization course is allegedly very good for this.

18. I regularly spent time to reflect on what I learned

19. The course activities enabled me to learn in different ways

20. I had opportunities to influence the course activities

21. I was able to learn by collaborating and discussing with others

Comments

Comments (I belonged to: Grupp 1)
I have worked almost entirely alone, and I enjoyed it!

Comments (I belonged to: Grupp 2)
No one seemed to have knowledge on any of the problems I was having

22. I was able to get support if I needed it